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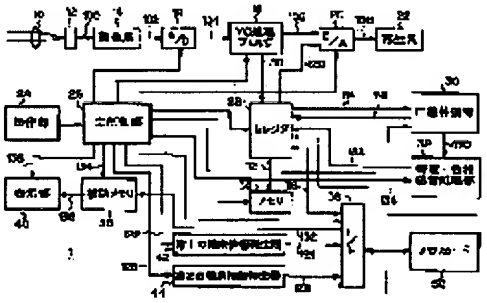
(54) IMAGE RECORDER

(57)Abstract:
PURPOSE: To efficiently retrieve plural images recorded on a recording medium.
CONSTITUTION: An electronic still camera 1 uses a reproduction system 22 to reproduce an electric signal obtained by picking up the image of an object with an image pickup lens 10 in the case of image pickup as a visual image and image data represented by the electric signal are fed to a compounding section 30. Thus, image data are compression-coded and stored in an image data storage area 52 of a memory card 50 and image retrieval information such as a luminance and hue representing a characteristic of an image is generated by a luminance hue statistic processing section 32 in parallel and the information is stored in a management data storage area 510 of the memory card 50. In the case of retrieval, the image retrieval information is read out of the memory card 50 and stores it once in an auxiliary memory 38 and the stored image retrieval information is displayed on a display section 40. In this case, the operator selects a required image based on the image retrieval information displayed on the display section 40 and the selected image is read out of the memory card 50 and reproduced by a reproduction system 22 as a visual image.



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* NOTICES *

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CLAIMS

[Claim(s)]
[Claim 1] In the image recording equipment which has a record means to record the 2nd image data changed from the 1st image data which consists of a primary signal of one screen showing a photographic subject image on the image data storage area of a record medium 1st processing means by which this equipment changes said 1st image data into the 3rd image data which consists of brightness and a color-difference signal, A compression means to divide said 3rd image data into two or more blocks, to carry out two-dimensional orthogonal transformation of the image data of each this divided block, and to output the transform coefficient of each block, Input the transform coefficient of each block from this compression means, and the 1st or 2nd transform coefficient is extracted out of the transform coefficient of this the block of each. The 1st management data for retrieval which expresses the description of the brightness of one screen of said photographic subject image from this 1st transform coefficient is generated. Moreover, the 2nd processing means which generates the 2nd management data for retrieval which expresses the description of the hue of one screen of said photographic subject image from this 2nd transform coefficient, It is image recording equipment characterized by having the control means which controls said processing means and compression means of the 1st thru/or 2, and for this control means controlling said record means, and making the predetermined management data storage region of this record medium memorize said 1st or 2nd generated management data.
[Claim 2] A read-out means by which this equipment reads data from said record medium in response to control of said control means further in image recording equipment according to claim 1, A storage means to memorize the 1st or 2nd management data of the data read from said record medium in response to control of said control means, the 1st or 2nd management data memorized by said storage means being read, and in response to control of said control means, with the display means which indicates by visible this 1st or 2nd management data that carried out reading appearance It has an actuation means to perform retrieval directions of said 2nd image data memorized by said storage. Said control means The 1st or 2nd management data memorized by said storage means based on directions of said actuation means is referred to. Image recording equipment characterized by reading the 2nd image data which specified said 2nd image data memorized by said record medium by refer to this, and controlled and this specified said read-out means from this record medium.
[Claim 3] It sets to image recording equipment at claim 1. Said 1st processing means Image data to the 1st luminance signal Y and color-difference-signal R-Y showing red R, Green G, and blue B And color-difference-signal B-Y A means to change into the 3rd image data to express is included. Said compression means A blocking means to divide said 3rd image data into two or more blocks, The 1st and 2nd dc components for every block carry out two-dimensional orthogonal transformation of the image data of each divided this block, and according to this two-dimensional orthogonal transformation, A two-dimensional orthogonal transformation means to output the transform coefficient of an alternating current component is included. Said 2nd processing means The 1st extract means which inputs the transform coefficient of each block from said compression means, and extracts the transform coefficient of the 1st dc component

out of the transform coefficient of this the block of each, The 2nd extract means which inputs the transform coefficient of each block from said compression means, and extracts the transform coefficient of the 2nd dc component out of the transform coefficient of this the block of each, The 1st management data generation means which inputs the transform coefficient of the 1st dc component from said 1st extract means, and generates the 1st management data, Image recording equipment characterized by including the 2nd management data generation means which inputs the transform coefficient of the 2nd dc component from said 2nd extract means, and generates the 2nd management data.

[Claim 4] In image recording equipment according to claim 3, the transform coefficient of said 1st dc component is a transform coefficient of the dc component of the luminance signal Y of said the block of each, and the transform coefficient of said 2nd dc component is [a transform coefficient and] color-difference-signal R-Y [of a luminance signal Y] of a dc component of said each block. And color-difference-signal B-Y Image recording equipment characterized by being with the transform coefficient of a dc component.

[Claim 5] In image recording equipment according to claim 3, said 1st management data includes the information on the average value corresponding to the transform coefficient of the dc component of the luminance signal Y of said the block of each, and said 2nd management data is [a transform coefficient and] color-difference-signal R-Y [of a luminance signal Y] of a dc component of said each block. And color-difference-signal B-Y Image recording equipment characterized by including the information on the average value corresponding to the transform coefficient of a dc component.

[Claim 6] Setting to image-recording equipment according to claim 3, this equipment is said luminance signal Y and color-difference-signal R-Y further. And color-difference-signal B-Y Said control means is image-recording equipment characterized by to control said record means and to make the image data storage area of this record medium memorize this 2nd image data that carried out compression coding including the 3rd processing means changed into the 2nd image data which carried out compression coding from the 3rd image data to express.

[Claim 7] It is image recording equipment characterized by the format of said compression coding being a format of the Huffman compression coding in image recording equipment according to claim 6.

[Claim 8] In image recording equipment according to claim 6, this equipment elongates further the 2nd image data by which compression coding was carried out from said storage. A luminance signal Y and color-difference-signal R-Y And color-difference-signal B-Y The 4th processing means changed into the 4th image data to express, A playback means to change said 4th image data into a visible image is included. Said control means Control said read-out means, and read the 2nd image data by which compression coding was carried out from said record medium, and said 4th processing means is controlled further. the image recording equipment which changes into the 4th image data this 2nd image data that carried out reading appearance, and is characterized by making said playback means reproduce the 4th this changed image data.

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] About image recording equipment, especially, this invention records two or more images, and relates two or more recorded images to the image recording equipment which can be searched efficiently.
[0002]
[Description of the Prior Art] When recording an image on record media, such as a magnetic disk, IC memory card, and an optical disk, many images are recorded on one record medium.
[0003] In searching a specific image out of the image with which such a large number were recorded, it was being begun to read every one video signal recorded on the record medium, the image was projected on the picture monitor, the operator looked at this, and it has chosen the specific image. Thus, since read-out of the signal from an optical disk took most time amount when reading many video signals from a record medium one by one for example, the latency time was produced in projecting of each image, and retrieval by the check of an image was not able to be performed at high speed.
[0004]
[Problem(s) to be Solved by the Invention] In order to lessen such read-out time amount, a directory, i.e., a title, is given and recorded for example, on each image, and there is a method of reading and searching this. However, even if the difficult thing has also given the title which expresses the description of the image depending on an image and it gives a title in such a case, only he who gave can understand in many cases, and since an operator cannot search if he does not look at each image itself, it is lacking [operator] in versatility.
[0005] This invention cancels the fault of such a conventional technique, and it aims at offering the image recording equipment which records an image and is reproduced so that retrieval whose operator looks at at a time two or more one image recorded on the record medium, and checks it can be performed efficiently.
[0006]
[Means for Solving the Problem] In the image recording equipment which has a record means to record the 2nd image data changed from the 1st image data which consists of a primary signal of one screen showing a photographic subject image according to this invention on the image data storage area of a record medium 1st processing means by which this equipment changes the 1st image data into the 3rd image data which consists of brightness and a color-difference signal, A compression means to divide the 3rd image data into two or more blocks, to carry out two-dimensional orthogonal transformation of the image data of each divided block, and to output the transform coefficient of each block, Input the transform coefficient of each block from a compression means, and the 1st or 2nd transform coefficient is extracted out of the transform coefficient of each block. The 2nd processing means which generates the 2nd management data for retrieval which generates the 1st management data for retrieval which expresses the description of the brightness of one screen of a photographic subject image from the 1st transform coefficient, and expresses the description of the hue of one screen of a photographic subject image from the 2nd transform coefficient, It has the control means which controls the

processing means and compression means of the 1st thru/or 2, and this control means controls a record means and the predetermined management data storage region of a record medium is made to memorize the 1st or 2nd generated management data.
[0007] The read-out means which reads data from a record medium in response to control of a control means further according to this invention, A storage means to memorize the 1st or 2nd management data of the data read from the record medium in response to control of a control means, The display means which reads the 1st or 2nd management data memorized by the storage means, and indicates the 1st or 2nd read management data by visible in response to control of a control means, It has an actuation means to perform retrieval directions of the 2nd image data memorized by the storage. A control means The 2nd image data which specified the 2nd image data memorized by the record medium by reference with reference to the 1st or 2nd management data memorized by the storage means based on directions of an actuation means, and controlled and specified the read-out means is read from a record medium.
[0008]
[Function] according to the image recording equipment by this invention, the 1st management data showing the description of the brightness of one screen of the photographic subject image for retrieval and (or) the 2nd management data showing the description of a hue for retrieval are generated in the case of photography, and it memorizes them to the predetermined management data storage region of a record medium while recording the 2nd image data of one screen showing a photographic subject image on the predetermined image data storage area of a record medium. moreover, in case the 2nd image data memorized by the record medium is searched, by directions of an actuation means, the 1st and (or) 2nd management data first memorized by the record medium are read, the 1st and (or) 2nd management data which were memorized by the storage means and were further memorized by the storage means are read, and it is displayed on a display means. the contents of a display are seen, an operator performs directions showing the description of the image needed with an actuation means, and a control means specifies the 2nd image data memorized by the record medium by reference with reference to the 1st and (or) 2nd management data memorized by the storage means based on the directions. And the 2nd image data specified with playback directions of an actuation means is read from a record medium, and a playback means is made to reproduce the 2nd read image data.
[0009]
[Example] Next, with reference to an accompanying drawing, the example of the image recording regenerative apparatus by this invention is explained to a detail. One example of the electronic "still" camera with which the image recording regenerative apparatus in this invention is applied is shown in drawing 1 . This electronic "still" camera 1 is reproduced by the reversion system 22 by using as a visible image the electrical signal which picturized and obtained the image of a photographic subject with the image pick-up lens 10 in the case of photography. Moreover, the image data which this electrical signal expresses is sent to the compression elongation section 30, compression coding of the image data is carried out by this, and it is the image data storage area 520 of a memory card 50. It accumulates. The image retrieval information that brightness and the hue statistics processing section 32 express the description of the image in parallel to this, such as brightness and a hue, is generated, and it is the management data storage region 510 of a memory card 50 about it. It accumulates. In the case of retrieval, this equipment reads image retrieval information in this memory card 50, once accumulates it in auxiliary memory 38, and displays that accumulated image retrieval information on a display 40. Then, an operator chooses a required image based on the image retrieval information displayed on the display 40, and it is equipment which reads the selected image from a memory card 50, and is reproduced by the reversion system 22 as a visible image. A memory card 50 is the semiconductor memory which it accumulates in the condition which can storage hold the digitized image data which is transmitted from electronic "still" camera 1 body, and can output a picture signal to the electronic "still" camera 1 as a host device according to a demand.
[0010] The image pick-up lens 10 is an image sensor (CCD) 12 about the optical image of a photographic subject. Image formation is carried out to an image pick-up side. An image sensor 12 is a solid state image sensor which changes and outputs image formation with the image pick-

up lens 10 to an electrical signal. An image sensor 12 is changed RGB. Output 100 to which the pixel signal was connected in the image pick-up system 14 It outputs. The image pick-up system 14 is an input 100. Inputted RGB It is an output 102 about the picture signal which pretreated magnification, white balance adjustment, gradation amendment, etc. to the picture signal, and was processed. Connected analog digital (A/D) Outputting to a transducer 16, an analog-to-digital converter 16 is an input 102. RGB of the analog which appeared A picture signal is changed into the image data expressed with digital value. An analog-to-digital converter 16 is digitized RGB. Output 104 to which image data was connected in YC processing block 18 Outputting, YC processing block 18 is an input 104. RGB which appeared They are the luminance-signal data Y and the color-difference-signal data Cr and Cb about image data. It changes into data format. Output 106 of YC processing block 18 Digital-to-analog (D/A) Connecting with a transducer 20, a digital to analog converter 20 is an input 106. Output 108 to which the inputted image data was changed into the picture signal expressed with the analog value, and the changed picture signal was connected in the reversion system 22 It outputs. A reversion system 22 is an input 108. The video signal which changed into the video signal for a display of the inputted picture signal, and was changed and acquired is outputted to displays, such as a monitoring device, and the image which this video signal expresses is displayed.

[0011] On the other hand, a selector 28 is a function part which controls the transfer path of image data in response to control of the below-mentioned main control section 26, and transmits image data to a desired circuit. It is a path cord 110 about the image data changed into a data format predetermined by YC processing block 18. It is a path cord 112 about the image data which was minded, and was inputted and inputted. It minds and transmits to memory 34. Memory 34 is an input 112. It is an output 112 about the image data in which it is the frame memory in which the image data which appeared is stored, and memory 34 was stored in response to control of the main control section 26. It outputs, a selector 28 is minded and it is the output 114. It transmits to the connected compression elongation section 30 which is mentioned later. The compression elongation section 30 receives control of the main control section 26, and is an input 114. Compression processing of two-dimensional orthogonal transformation, quantization, Huffman coding, etc. is performed to the inputted image data. Moreover, the compression elongation section 30 is a memory card 50 to the input 114. Elongation processing of the Huffman decode, reverse quantization, rectangular inverse transformation, etc. is performed to the inputted image data by which Huffman coding was carried out. About this, it mentions later. The compression elongation section 30 minds a selector 28 for the compressed image data further, and is the output 118. Connected interface 36 (I/F) It outputs. An interface 36 consists of connectors which connect an electronic "still" camera 1 and a memory card 50. Data, such as image data which was made to equip a camera 1 with a memory card 50 free [attachment and detachment], and was outputted from the selector 28, are transmitted at a memory card 50 to the bottom of the control signal supplied from the main control section 26. Moreover, data, such as image data outputted from the memory card 50 to the bottom of the control signal supplied from the main control section 26, are transmitted to a selector 28 and the auxiliary memory 38 mentioned later. Data, such as management data outputted from the memory card 50 to the bottom of the control signal which transmits an interface 36 at a memory card 50 to the bottom of the control signal to which data, such as management data outputted again from the 1st and 2nd retrieval information generators 42 and 43 mentioned later, are supplied from the main control section 26, and is supplied from the main control section 26, are transmitted to auxiliary memory 38.

[0012] When the internal configuration of the compression elongation section 30 in this example is explained to a detail with reference to Fig. 2, next, this compression elongation section 30 As a compression system, it is the blocking section 210. Two-dimensional orthogonal transformation section 220 Quantization section 230 Huffman coding section 240 It has and is the Huffman decode section 250 as an elongation system. Reverse quantization section 260 Rectangular inverse transformation section 270 It has.

[0013] if the detail of each part is explained -- the blocking section 210 it inputted into this frame buffer from memory 34 including the frame buffer -- for example, -- horizontal -- 720 and

a perpendicular direction -- 480 each -- the image data for one image which consists of the number of pixels -- two or more blocks -- for example, -- respectively -- 8x8 It divides and outputs to the block of a pixel. The two-dimensional orthogonal transformation section 220 is a circuit which carries out two-dimensional orthogonal transformation of the image data for every block. As two-dimensional orthogonal transformation, well-known orthogonal transformation, such as discrete cosine conversion and a Hadamard transform, is used. It is arranged in all directions and the sequential output of the image data for every block by which two-dimensional orthogonal transformation was carried out is carried out so that it may become high order data from the data of a low degree. The data of a dc component are outputted first. That is, it is the quantization section 230 per block to the order of a dc component DC and a frequency component to a high frequency component with the low alternating current component AC, the image data, i.e., the transform coefficient, of the result by which two-dimensional orthogonal transformation was carried out. And it is sent to the brightness and the hue statistics processing section 32 mentioned later.

[0014] Quantization section 230 In the case of quantization, quantization and a multiplier cut-off are performed to this transform coefficient. Quantization quantizes by doing the division of the transform coefficient with the quantization step value according to a quantization multiplier. As compared with a predetermined threshold, a multiplier cut-off rounds off the part below the threshold, and omits the quantized multiplier. A quantization multiplier is called for based on the value, i.e., total activity, which totaled the activity for every block. Quantization section 230 It is scanned in the shape of zigzag per block in order of the alternating current component of a frequency to a low high frequency, and the quantized data are the Huffman coding section 240. It is supplied. the Huffman coding section 240 The quantization section 230 from -- the transform coefficient inputted is encoded. Since zero continue in many cases, the alternating current component of a transform coefficient asks for run length, the amount, i.e., the zero, which the data of the value of zero follow, and the amplitude of non-zero, and carries out two-dimensional Huffman coding of this. Coding section 240 The coded-image data for every block are sent to memory card 50 through a signal line 116, a selector 28, a signal line 118, and an interface 36. Memory card 50 is accumulated in a predetermined image data storage area in the bottom of the write-in control signal to which the sent coded-image data for every block are supplied through an interface 36 from the main control section 26. in addition, the Huffman coding section 240 after -- the fixed-length-ized section -- preparing -- the coding section 240 from -- a variable-length data may be changed into fixed length data, and the fixed length data may be accumulated in the predetermined image data storage area of memory card 50.

[0015] On the other hand, it is the decode section 250. Under the read-out control signal supplied through an interface 36 from the main control section 26, they are an interface 36, a signal line 118, a selector 28, and a signal line 114 from memory card 50. It is the circuit which carries out the Huffman decode of the coded data read by minding for every coded data. The data by which the Huffman decode was carried out are supplied to the reverse quantization circuit 260. Reverse quantization section 260 The multiplication of the same multiplier as the quantization multiplier at the time of decode data quantizing is carried out, and it reverse-quantizes. The reverse-quantized data are the rectangular inverse transformation section 270, respectively. It is supplied. Rectangular inverse transformation section 270 Two-dimensional orthogonal transformation section 220 It is the conversion reverse circuit which reproduces image data with an algorithm contrary to the algorithm of orthogonal transformation which can be set. This rectangular inverse transformation section 270 The restoration data by which inverse transformation was carried out are a signal line 116, a selector 28, and a signal line 120. It minds and is sent to a digital to analog converter 20. A digital to analog converter 20 is an input 120. Output 108 to which the inputted image data was changed into the picture signal expressed with the analog value, and the changed picture signal was connected in the reversion system 22 It outputs. A reversion system 22 is an input 108. The video signal which changed into the video signal for a display of the inputted picture signal, and was changed and acquired is outputted to displays, such as a monitoring device, and the image which this video signal expresses is displayed. In this case, the image chosen by the operator at the time of retrieval is

advantageously displayed on a display.

[0016] When the internal configuration of the brightness and the hue statistics processing section 32 in this example is explained to a detail with reference to Fig. 3, next, this brightness and hue statistics processing section 32 As a brightness system, it is DC multiplier extract section 310 of Y. Brightness data statistics processing section 320 It has. As a hue system Y-Cr-Cb DC multiplier extract section 330 Matrix circuit 340 The hue data extraction section 350 and the hue data statistics processing section 360 It has.

[0017] DC multiplier extract section 310 of Y The two-dimensional orthogonal transformation section 220 from -- signal line 130 Y, Cr, and Cb of each block of one screen sent by minding Y, Cr, and Cb of the order of a frequency component to DC transform coefficient and a low high frequency component It is Y extract circuit which extracts DC transform coefficient of Y of each block of one screen out of AC transform coefficient. This Y extract circuit 310 An output is the brightness data statistics processing section 320. It connects with the input. Brightness data statistics processing section 320 Although not illustrated, it has the 1st comparator circuit which extracts min and maximum, the 1st arithmetic circuit which computes the average of DC transform coefficient of Y in 1 screen, and the 2nd arithmetic circuit which computes the standard deviation of DC transform coefficient of Y in 1 screen out of the data of DC transform coefficient of Y of each block of one screen. The 1st comparator circuit is a signal line 132 about the data of DC transform coefficient of Y in which DC transform coefficient value of Y in 1 screen is once accumulated, DC transform coefficient value of each block in [which was accumulated] it is compared, min and maximum are extracted and the min and maximum which were extracted are shown from this comparison. It outputs. The 1st arithmetic circuit is an arithmetic circuit which calculates the average value of DC transform coefficient of Y in 1 screen, and is an arithmetic circuit which all applies DC transform coefficient value of the total block count of one accumulated screen, i.e., Y of 5400 blocks, and carries out division of the value by the total block count and 5400 in this example. The average mu of DC transform coefficient of Y of one screen for which it asked by this 1st arithmetic circuit is a signal line 132. It is outputted. The 2nd arithmetic circuit is (1) which is the arithmetic circuit which computes the standard deviation sigma of DC transform coefficient of Y in 1 screen, and is shown below. A formula may be used.

[0018]

[Equation 1]

$$\sigma = (1/K) \sum_{i=1}^{k} | y_i - \mu | \qquad \ldots\ldots (1)$$

In an upper type, K is 5400 in the total block count of one screen, and this example, yi is DC transform coefficient value of Y of each block of one screen, and mu is the average of DC transform coefficient of Y of one screen for which it asked in the 1st arithmetic circuit. 1/K A next formula subtracts the average value mu of DC transform coefficient of Y from DC transform coefficient value of Y of each block, all adds the absolute value of each block searched for by this subtraction, and is calculating the total value of a whole block. In this example, a standard deviation sigma is the value which carried out division of the total value of this whole block, and calculated it 5400. Thus, the standard deviation sigma of one screen for which it asked is a signal line 132. It is outputted. the brightness data statistics processing section 320 from -- management data, such as the minimum value of DC transform coefficient of Y of one screen outputted, maximum, an average value mu, and a standard deviation sigma, are sent to memory card 50 through a signal line 132, a selector 28, a signal line 118, and an interface 36. Memory card 50 is accumulated in a predetermined management data storage region in the bottom of the write-in control signal to which the management data of one sent screen is supplied through an interface 36 from the main control section 26. Since it is quantizing in 8 bits to 1 pixel, the management data in this example in this case is 0-255. 256 The value of level is taken. In addition, as mentioned above, by this example, although DC transform coefficient of Y was used, AC transform coefficient of predetermined Y may be used. Moreover, the brightness data statistics processing section 320 The arithmetic circuit which

computes Distribution S by carrying out the square of the standard deviation sigma may be prepared.

[0019] moreover, Y-Cr-Cb DC multiplier extract section 330 The two-dimensional orthogonal transformation section 220 from -- signal line 130 Y, Cr, and Cb of each block of one screen sent by minding Y, Cr, and Cb of the order of a frequency component to DC transform coefficient and a low high frequency component Y, Cr, and Cb of each block of one screen out of AC transform coefficient Y, Cr, and Cb which extract DC transform coefficient It is an extract circuit. This Y, Cr, and Cb Extract circuit 330 An output is a matrix circuit 340. It connects with the input. Matrix circuit 340 Although not illustrated, it is Y, Cr, and Cb of each block. They are once R, G, and B about the DC transform coefficients EY, ECr, and ECb. The 1st conversion circuit changed into the DC transform coefficients ER, EG, and EB, R, G, and B of this the changed block of each It is XYZ about DC transform coefficient values ER, EG, and EB. Chromaticity-coordinate value in a color space (x y, Y) The 2nd conversion circuit to change, This chromaticity-coordinate value (x y, Y) A predetermined translation table is used (H, V, C). It has the 3rd conversion circuit to change. H is the hue Hue which is one of the three attributes of human being's color perception here, In V, C expresses thickness Chroma of a color to brightness Value and this appearance similarly.

[0020] The 1st conversion circuit is Y, Cr, and Cb of each block. They are once R, G, and B about the DC transform coefficients EY, ECr, and ECb. (2), (3), and (4) which have the circuit changed into DC transform coefficient values ER, EG, and EB, and are shown in conversion below A formula may be used.

[0021]

EY =0.334 ER+0.585EG+0.081EB .... (2) ECr =0.666ER-0.585EG-0.081EB .... (3) ECb =0.334 ER-0.585EG+0.919EB .... (4) ER, EG, and EB which were computed by the 1st conversion circuit using such a formula are supplied to the 2nd following conversion circuit. The 2nd conversion circuit is a chromaticity-coordinate value (x y, Y) about DC transform coefficient values ER, EG, and EB. (5) and (6) which have the circuit to change and are shown in conversion below And (7) types may be used.

[0022]

[Equation 2]

$$\begin{vmatrix} X \\ Y \\ Z \end{vmatrix} = \begin{vmatrix} 0.608 & 0.174 & 0.200 \\ 0.299 & 0.587 & 0.144 \\ 0.0 & 0.066 & 1.112 \end{vmatrix} \times \begin{vmatrix} E_R \\ E_G \\ E_B \end{vmatrix} \quad \cdots (5)$$

x=X/(X+Y+Z) .... (6) y=Y/(X+Y+Z) .... (7) Chromaticity-coordinate value computed by the 2nd conversion circuit using such a formula (x y, Y) The 3rd following conversion circuit is supplied. The 3rd conversion circuit is a chromaticity-coordinate value (x y, Y). A predetermined translation table is used (H, V, C). It changes into a value. The data in which the value of H, V, and C of each changed block is shown are the hue data extraction section 350. It is supplied, respectively. Hue data extraction section 350 It is H selection circuitry which extracts H data showing a hue out of the data of H, V, and C of each block supplied from the 3rd conversion circuit. H selection circuitry 350 from -- H data outputted -- the following hue data statistics processing section 360 It is sent.

[0023] Hue data statistics processing section 360 Y of the 2nd comparator circuit which extracts min and maximum out of the hue H data of one screen although not illustrated, the 3rd arithmetic circuit which computes the average value of the hue H data in 1 screen, and the hue H data in 1 screen It has the 4th arithmetic circuit which computes the standard deviation of DC transform coefficient. The 2nd comparator circuit is a signal line 134 about the hue H data in which the hue H data in 1 screen are once stored, the hue H data of each block in [which was accumulated] it are compared, min and maximum are extracted and the min and maximum which were extracted are shown from this comparison. It outputs. The 3rd arithmetic circuit is an arithmetic circuit which calculates the average value of the hue H data in 1 screen, and is an arithmetic circuit which all adds the total block count of one accumulated screen, i.e., the hue H

data of 5400 blocks, and carries out division of the value by the total block count and 5400 in this example. Average muH of H data of one screen for which it asked by this 3rd arithmetic circuit It is a signal line 134. It is outputted. The 4th arithmetic circuit is standard deviation sigmaH of H data in 1 screen. (8) which is the arithmetic circuit to compute and is shown below A formula may be used.

[0024]

[Equation 3]

$$\sigma_H = (1/K) \sum_{i=1}^{k} | H_i - \mu_H | \quad \ldots\ldots (8)$$

In an upper type, K is 5400 in the total block count of one screen, and this example, Hi is the value of H data of each block of one screen, and it is muH. It is the average of H data of one screen for which it asked in the 3rd arithmetic circuit. 1/K A next formula is average-value muH of H data to H data of each block. It subtracts, the absolute value of each block searched for by this subtraction is all added, and the total value of a whole block is calculated. At this example, it is standard-deviation sigmaH. It is the value which carried out division and which was calculated with the total value 5400 of this whole block. Thus, standard deviation sigmaH of one screen for which it asked It is a signal line 134 by the 4th arithmetic circuit. It is outputted. the hue data statistics processing section 360 from -- minimum value [of H data of one outputted screen], maximum, and average-value muH And standard-deviation sigmaH etc. -- management data is sent to memory card 50 through a signal line 134, a selector 28, a signal line 118, and an interface 36. Memory card 50 is accumulated in a predetermined management data storage region in the bottom of the write-in control signal to which the management data of one sent screen is supplied through an interface 36 from the main control section 26. Since it is quantizing in 8 bits to 1 pixel, the management data of the hue in this example as well as [in this case] brightness data is 0-255. 256 The value of level is taken.

[0025] In addition, at this example, they are Y, Cr, and Cb as mentioned above. Although DC transform coefficient was used, it is Y, predetermined Cr, and predetermined Cb. AC transform coefficient may be used. Moreover, the hue data statistics processing section 360 Standard deviation sigmaH A square is carried out and it is Distribution SH. The circuit to compute may be prepared. furthermore, the hue data extraction section 350 Matrix circuit 340 from -- the circuit which extracts V of each block supplied, and C data -- preparing -- the hue data statistics processing section 360 further -- minimum value [of the data of V and C of one screen], maximum, and average-value muH, and standard-deviation sigmaH etc. -- the circuit which computes management data may be prepared. Thereby, the management data of V and C may be accumulated in the predetermined management data storage region of memory card 50. Four kinds of image pick-up images 610, 620, and 630 at the time of using the equipment of this example for drawing 6 And 640 The average of brightness and a hue and the measured value of distribution are shown.

[0026] It is the main control section 26 based on [the 1st retrieval information generator 42 has the 1st character generating circuit and the 1st control circuit which controls it by returning to drawing 1 , and] actuation of a control unit 24 to the control line 122. It is a signal line 124 about the character data which minded, received the control signal, and generated and generated the character data showing the date for example, at the time of photography, a screen size, etc. with the control signal. It minds and outputs to an interface 36. In this case, the main control section 26 to the control line 122 The control signal outputted by minding is the photography carbon button 410 of a control unit 24 at this example. Press is detected and, sometimes, the main control section 26 is generating automatically. Therefore, the management data which carried out in this way and was obtained is automatically accumulated in a predetermined management data storage region in the bottom of the write-in control signal supplied through an interface 36 from the main control section 26. Next, the 2nd retrieval information generator 44 has the 2nd character generating circuit and the 2nd control circuit which controls it. A generator 44 is the main control section 26 based on actuation of a control unit 24 to the control line 126. It is a signal line 128 about the character data which minded, received the

control signal, generated the character data which expresses a user name, a title, a retrieval keyword, etc. of a photography image based on the control signal, and was generated. It minds and outputs to an interface 36. In this case, the main control section 26 to the control line 126 The control signal supplied by minding is the selection carbon button 440 of a control unit 24. Inner letter key 448 foolish [even if] The main control section 26 detects press and the main control section 26 occurs corresponding to that press. Moreover, the management data which carried out in this way and was obtained is accumulated in a predetermined management data storage region in the bottom of the write-in control signal supplied through an interface 36 from the main control section 26.

[0027] It is read from the predetermined management data storage region of memory card 50 to the bottom of control of the main control section 26, and auxiliary memory 38 is a signal line 132. It is the memory which accumulates the management data which appeared, and auxiliary memory 38 is the control signal 134 of the main control section 26. It is an output 136 about the management data stored by winning popularity. It outputs. Output 136 of auxiliary memory 38 It connects with the input of a display 40. a display 40 -- control signal 138 of the main control section 26 being based -- this example -- output 136 Minimum value [of the user name of the date at the time of photography, a screen size, and a photography image, a title a retrieval keyword and DC transform coefficient of Y], maximum, average mu, standard-deviation sigma and minimum value [of a hue], maximum, and average muH and standard-deviation sigmaH which were outputted etc. -- the management data is indicated by visible.

[0028] A control unit 24 is a function part which directs photography, image retrieval, retrieval information input, image selection, image reconstruction, etc. When the switch configuration of the control unit 24 in this example is explained to a detail with reference to Fig. 4, this control unit 24 is the photography carbon button 410. Retrieval carbon button 420 Playback carbon button 430 Selection carbon button group 440 It has. Selection carbon button group 440 For example, blue carbon button 442 which specifies a bluish image ** carbon button 444 which specifies a bright image Contrast carbon button 446 which specifies the strong image of contrast Kana alphabetic character carbon button group 448 The U.K. and figure carbon button group 450 It contains. Photography carbon button 410 By press, the main control section 26 detects the press. While making the image pick-up of a photographic subject, and compression of the image pick-up image data perform and making it accumulate the compressed data in the predetermined image data storage area of memory card 50 The user name of the date at the time of photography, a screen size, and a photography image, a title, a retrieval keyword, It is made to accumulate management data, such as minimum value [of DC transform coefficient of Y], maximum, average mu, standard-deviation sigma and minimum value [of a hue], maximum, and average muH, and standard-deviation sigmaH, in the predetermined management data storage region of memory card 50. Moreover, retrieval carbon button 420 The main control section 26 detects the press, reads management data from the predetermined management data storage region of memory card 50, makes it store in auxiliary memory 38, and makes a visible display perform the stored management data to a display 40 by press. Playback carbon button 430 It is the selection carbon button group 440 which the main control section 26 detects the press, and mentions later by press. Read-out is made to perform the specified image from memory card 50, and it is made to reproduce the specified image to a reversion system 22.

[0029] For example, it sets to actuation and is the retrieval carbon button 420 first. Press is performed and it is the post selection carbon button group 440. Blue carbon button 442 When pressed, The main control section 26 detects the press of both, and the management data stored in auxiliary memory 38 by that cause is referred to. The data in which a bluish image is shown out of the management data are extracted, a bluish image is read from memory card 50 based on the extracted data, and the read image is reproduced to a reversion system 22. Average muH of H data mentioned above as management data showing a bluish image You may use. When there are two or more bluish images, it may read in order of the address of memory card 50, and sequential playback of it may be carried out by the reversion system 22. Retrieval carbon button 420 After being pressed, it is the ** carbon button 444. When pressed, similarly, the main control section 26 extracts the data in which a bright image is shown out of the

management data of auxiliary memory 38, reads a bright image from memory card 50 based on the extracted data, and is reproduced to a reversion system 22 in the read image. As management data showing a bright image, the average mu of DC transform coefficient of Y mentioned above may be used. Similarly, it is the retrieval carbon button 420. After being pressed, it is the contrast carbon button 446. When pressed, the main control section 26 extracts the data in which the strong image of contrast is shown out of the management data of auxiliary memory 38, reads the strong image of contrast from memory card 50 based on the extracted data, and is reproduced to a reversion system 22 in the read image. As management data showing the strong image of contrast, it is easy to be the large thing of the difference of the minimum value of DC transform coefficient of Y, and maximum mentioned above, for example.

[0030] Furthermore, it sets to actuation and is the kana alphabetic character carbon button group 448. And English and figure carbon button group 450 When an operator accumulates in the predetermined management data storage region of memory card 50, he uses management data, such as a user name of a photography image, a title, and a retrieval keyword. It is the retrieval carbon button 420 beforehand in that case. It is not necessary to press. Moreover, kana alphabetic character carbon button group 448 And English and figure carbon button group 450 While an operator looks at the management data by which it was indicated by visible to a display 40, it uses, also when specifying the management data of a required image. It is the retrieval carbon button 420 beforehand in that case. After pressing and specifying management data, it is the retrieval carbon button 420 again. It presses. For example, alphabetic character carbon button group 448 It uses, is specified as brightness or an average, and is the figure carbon button group 450 to the degree. The figure which uses and shows the average value of a required image is specified, and it is the retrieval carbon button 420 to the last. Press performs retrieval of the image in which the average value is shown in the main control section. And playback carbon button 430 Press performs playback of the image corresponding to the figure by the reversion system 22.

[0031] In addition, the carbon button which may prepare the carbon button which specifies red, green, etc. other than a blue carbon button as a manual operation button, and divides into two or more phases and can be specified as them also about brightness and contrast may be prepared, and when specifying the numeric value of management data etc. further, the carbon button which gives width of face to a numeric value may be prepared. When such a carbon button is prepared in a control unit 24, the control function corresponding to it may be prepared in the main control section 26.

[0032] The main control section 26 is a control circuit which controls and manages an above-mentioned function part. minimum value [of DC transform coefficient of Y], maximum, average mu, standard-deviation sigma and minimum value [of a hue], maximum, and average muH and standard-deviation sigmaH by which especially the main control section 26 is characterized [of one screen] in this invention at brightness and the hue statistics processing section 32 etc. -- it has the function which generates management data and generates the control signal for accumulating the management data in the predetermined management data storage region of memory card 50. Moreover, based on the retrieval directions notified from a control unit 24, the main control section 26 reads management data from the predetermined management data storage region of memory card 50, accumulates it in auxiliary memory 38, and has the function which generates a control signal, respectively in order to make the accumulated management data into a display 40. Furthermore, the main control section 26 reads the image data based on management data from the predetermined image data storage area of memory card 50 with reference to the management data accumulated in auxiliary memory 38 based on the retrieval image information notified from a control unit 24, and has the function to generate a control signal, respectively in order to reproduce the read image data to a reversion system 22.

[0033] Memory card 50 is the management data storage region 510 which classified the storage region of a memory card 50 logically as shown in drawing 5 . Image data storage area 520 It has. Management domain 510 Image data storage area 520 It is the field where the information which manages the image data memorized is stored. Management data storage region 510 Field 511-

513 where it is classified into three fields according to this example, and each management data is memorized further It is arranged.
[0034] field 511 **** -- photography carbon button 410 of a control unit 24 Information, such as a date at the time of the photography automatically generated by the 1st retrieval information generator 42 in press and a screen size, is accumulated. moreover, field 512 **** -- the kana alphabetic character carbon button 448 of a control unit 24, and the U.K. and a figure carbon button 450 Information, such as a user name of the photography image generated by the 2nd retrieval information generator 42 in press, a title, and a retrieval keyword, is accumulated. further -- field 513 **** -- minimum value [of a hue], maximum, and average muH and standard deviation sigmaH etc. -- information is accumulated. [, such as the minimum value of DC transform coefficient of Y which shows the description of a photography image especially by this example, maximum, the average mu, and standard deviation sigma,] moreover, image data storage area 520 **** -- in the case of this example, the photoed image data is accumulated.
[0035] Actuation is explained. First, an electronic "still" camera 1 is equipped with a memory card 50, and the actuation in which the image data of the photographic subject picturized by the photography person and the management data showing the description of the image of the photographic subject are accumulated in the predetermined storage region of a memory card 50 is explained.
[0036] It is the photography carbon button 410 by the photography person. If pressed, image formation of the optical image of a photographic subject is carried out to the image pick-up side of an image sensor 12 through the image pick-up lens 10, and the image formation is RGB by the image sensor 12. It is changed into a pixel signal, is outputted to the image pick-up system 14, and is RGB. A pixel signal is RGB which pretreatment of magnification, white balance adjustment, gradation amendment, etc. was performed by the image pick-up system 14, and was pretreated. A pixel signal is outputted to an analog-to-digital converter 16. RGB of the pretreated analog It is changed into the image data expressed with digital value by the analog-to-digital converter 16, and is outputted to YC processing block 18, and a picture signal is the luminance-signal data Y and the color-difference-signal data Cr and Cb by YC processing block 18. It is changed into data format and outputted to a digital to analog converter 20. Those signals are changed into the picture signal expressed with the digital to analog converter 20 with the analog value, and are outputted to a reversion system 22. A reversion system 22 is changed into the video signal for a display of the inputted picture signal, and displays the video signal on displays, such as a monitoring device.
[0037] Y, Cr, and Cb which were outputted from YC processing block 18 on the other hand Image data is transmitted to memory 34 through a selector 28 in response to control of the main control section 26. Y, Cr, and Cb which were memorized by memory 34 Image data is transmitted to the compression elongation section 30 through a selector 28 in response to control of the main control section 26. Y, Cr, and Cb which were inputted into the compression elongation section 30 Image data is given by the compression system of the compression elongation section 30 in response to control of the main control section 26, and, as for the compressed image data, compression processing of two-dimensional orthogonal transformation, quantization, Huffman coding, etc. is transmitted to a memory card 50 through a selector 28 and an interface 36. The transmitted image data which was compressed receives control of the main control section 26, and is the predetermined image data storage area 520 of a memory card 50. It is accumulated.
[0038] moreover, Y, Cr, and Cb of each block of one screen picturized on the other hand Y, Cr, and Cb of the order of a frequency component to DC transform coefficient and a low high frequency component AC transform coefficient -- the two-dimensional orthogonal transformation section 220 of the compression elongation section 30 from -- DC multiplier extract section 310 and Y-Cr-Cb of Y of brightness and the hue statistics processing section 32 DC multiplier extract section 330 It is sent. DC multiplier extract section 310 of Y Y, Cr, and Cb of each sent block Y, Cr, and Cb of DC transform coefficient and a frequency component to a low high frequency component AC transform coefficient Extract section 310 An extract is performed and only DC transform coefficient of Y of each block of one screen is the brightness data statistics processing section 320 about ** and it. Delivery and DC transform coefficient of

Y of each sent block Processing section 320 Operation generation of the management data, such as the minimum value of DC transform coefficient of Y showing the brightness of one screen, maximum, an average value mu, and a standard deviation sigma, is carried out, and the generated management data is sent to memory card 50 through a selector 28 and an interface 36. The management data sent to memory card 50 is the predetermined management data storage region 513 of memory card 50 under the write-in control signal sent through an interface 36 from the main control section 26. It is accumulated.

[0039] Moreover, DC transform coefficient of Y-Cr-Cb is sent to the matrix circuit 340. DC multiplier extract section 330 Y, Cr, and Cb of each sent block Y, Cr, and Cb of DC transform coefficient and a frequency component to a low high frequency component AC transform coefficient is the extract section 330. Y, Cr, and Cb of each block of one screen Y, Cr, and Cb of each block which the extract of DC transform coefficient was performed and was extracted Matrix circuit 340 Y, Cr, and Cb of each sent block DC transform coefficient Circuit 340 Y, Cr, and Cb of each block DC transform coefficient EY, ECr and ECb to XYZ Chromaticity-coordinate value in a color space (x y, Y) Conversion is performed. Chromaticity-coordinate value furthermore changed (x y, Y) A predetermined translation table is used (H, V, C). It is the hue data extraction section 350 about the data in which it changes into and the value of H, V, and C of each changed block is shown. It has sent. Hue data extraction section 350 The data in which the value of H, V, and C of each sent block is shown are the extract section 350. It is the hue data statistics processing section 360 about H data with which the extract was performed and only H data showing a hue were extracted. It has sent. the hue data statistics processing section 360 sent H data of each block -- the processing section 360 Minimum value [of H data showing the hue of one screen], maximum, and average-value muH, and standard-deviation sigmaH etc. -- operation generation of the management data is carried out, and the generated management data is sent to memory card 50 through a selector 28 and an interface 36. The management data sent to memory card 50 is the predetermined management data storage region 513 of memory card 50 like [the bottom of the write-in control signal sent through an interface 36 from the main control section 26] the management data of brightness. It is accumulated. Even this is photography actuation.

[0040] Next, the electronic "still" camera 1 is equipped with the memory card 50, management data, such as brightness showing the description of the image pick-up screen memorized by the operator at this memory card 50 or a hue, are referred to, retrieval of a required image pick-up screen is performed, and the actuation the image pick-up screen chosen by this retrieval is reproduced by whose reversion system 22 is explained.

[0041] an operator -- retrieval carbon button 420 of a control unit 24 if it is pressed and it is detected by the main control section 26 -- control of the main control section 26 -- management data storage region 510 of memory card 50 from -- it is read and it is memorized to auxiliary memory 38. The management data furthermore memorized by auxiliary memory 38 is read from auxiliary memory 38 by control of the main control section 26, and is sent to a display 40, and the sent management data is displayed by the display 40. An operator chooses a required image pick-up image, looking at the management data displayed by the display 40 next. For example, it is the blue carbon button 442 by the operator. If pressed, the press will be detected, the management data stored in auxiliary memory 38 by that cause, for example, the data in which the average value of a hue is shown, will be referred to, and the main control section 26 will extract the data in which a bluish image is shown out of the data. Next, it is the playback carbon button 430 of a control unit 24 by the operator. If are pressed and it will be detected by the main control section 26, the compressed data of a bluish image will be read from the image data storage area of memory card 50 by control of the main control section 26, and the read compressed data will be further transmitted to the compression elongation section 30 through an interface 36 and a selector 28. The image data by which compressed data inputted into the compression elongation section 30 was given, and elongation processing of the elongation processing of the Huffman decode, reverse quantization, rectangular inverse transformation, etc. was carried out in response to control of the main control section 26 is transmitted to a digital to analog converter 20 through a selector 28. The image data inputted

into the transducer 20 is changed into the picture signal expressed with the analog value by the transducer 20, and is outputted to a reversion system 22. A reversion system 22 is changed into the video signal for a display of the inputted picture signal, and displays the video signal on displays, such as a monitoring device. in this case, the data in which a bluish image is shown -- the average of the hue of drawing 6 , 34.87 [i.e.,], it is -- the time -- photography image 640 It is made to display on the display of a reversion system 22. [for example,]

[0042] Moreover, it is the blue carbon button 442 by the operator. It is the ** carbon button 444 to instead of. When pressed, it is the blue carbon button 442 fundamentally. Actuation same with having been pressed is performed. However, the data in which the average value mu of for example, a YDC transform coefficient is shown are referred to as management data which expresses a bright image in this case. in this case, the data showing a bright image -- the average of the brightness of drawing 6 , 88.13 [i.e.,], it is -- the time -- photography image 630 It is made to display on the display of a reversion system 22. [for example,] Furthermore, it is the blue carbon button 442 by the operator. It is the contrast carbon button 446 to instead of. When pressed, it is the blue carbon button 442. And ** carbon button 444 Actuation same with having been pressed is performed. However, the large data of the difference of the maximum of for example, a YDC transform coefficient and the minimum value are referred to as management data which expresses the strong image of contrast in this case, and the image equivalent to it makes it display on the display of a reversion system 22.

[0043] Furthermore, when an operator wants to specify management data for a direct numeric value etc., an operator can specify required management data, looking at the management data by which it was indicated by visible to a display 40. In that case, it is the alphabetic character carbon button group 448 first, for example. It is specified as brightness and an average using a carbon button, and is the figure carbon button group 450 to the degree. The figure which shows the average value of a required image using a carbon button is specified, and it is the retrieval carbon button 420 to the last. Press performs retrieval of the image in which the average value is shown in the main control section 26. It is the playback carbon button 430 after that. Press is performed and playback of the image corresponding to the figure is performed by the reversion system 22.

[0044] Thus, at this example, compression coding of the image data which picturized the image of a photographic subject and obtained is carried out in the case of photography, and it is the image data storage area 520 of a memory card 50. It accumulates, management data which express the description of the image with brightness and the hue statistics processing section 32 in parallel to this, such as brightness and a hue, are generated, and it is the management data storage region 513 of a memory card 50 about it. It can accumulate. Management data can be read in this memory card 50 in the case of retrieval, it can once accumulate it in auxiliary memory 38, and can display that accumulated management data on a display 40. An operator can do selection assignment of a required image then with reference to the management data displayed on the display 40. And if an operator directs playback, the image specified from the memory card 50 can be read, and it can consider as a visible image by the reversion system 22. Therefore, this equipment has the effectiveness which management data showing the description of the image of a photographic subject, such as brightness and a hue, can be accumulated in storage, such as a memory card 50, and selection of the image which expresses the description out of the management data which read, and it was indicated by visible and indicated by visible can be performed, and can indicate the selected image by visible.

[0045]

[Effect of the Invention] Thus, according to the image regeneration equipment by this invention, it is the image data storage area 520 of a memory card 50 about the image data of the image of a photographic subject. It is the management data storage region 510 of a memory card 50 about management data which express the description of the image of the photographic subject effectively at the same time it memorizes, such as brightness and a hue. It is memorizable. Moreover, an operator reads and indicates the management data by visible effectively, can choose the image in which the description which looks at and needs it is shown, and can indicate the selected image by visible.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the block diagram showing one example of the electronic "still" camera with which this invention is applied.
[Drawing 2] It is the block diagram showing the example of a configuration of the compression elongation section shown in drawing 1 .
[Drawing 3] It is the block diagram showing the example of a configuration of brightness and the hue statistics processing section shown in drawing 1 .
[Drawing 4] It is drawing showing the example of a configuration of the push-button of the control unit shown in drawing 1 .
[Drawing 5] It is drawing showing the example of a configuration of the management of memory card shown in drawing 1 , and the contents of storage of an image data area.
[Drawing 6] It is drawing showing the example of management data of the image pick-up image measured by this example.
[Description of Notations]
1 Electronic "still" Camera (Body)
10 Image Pick-up Lens
12 Solid State Image Sensor (CCD)
14 Image Pick-up System
16 Analog-to-digital Converter (A/D)
18 YC Processing Block
20 Digital to Analog Converter (D/A)
22 Reversion System
24 Control Unit
26 Main Control Section
28 Selector
30 Compression Elongation Section
32 Brightness and Hue Statistics Processing Section
34 Memory
36 Interface (I/F)
38 Auxiliary Memory
40 Display
42 1st Retrieval Information Generator
44 2nd Retrieval Information Generator
50 Memory Card
210 Blocking Section
220 Two-dimensional Orthogonal Transformation Section
230 Quantization Section
240 Huffman Coding Section
250 Huffman Decode Section
260 Reverse Quantization Section
270 Rectangular Inverse Transformation Section

310 DC Multiplier Extract Section of Y
320 Brightness Data Statistics Processing Section
330 Y-Cr-Cb DC Multiplier Extract Section
340 Matrix Circuit
350 Hue Data Extraction Section
360 Hue Data Statistics Processing Section

[Translation done.]